RELATIONSHIP OF SERUM PROGESTERONE PROFILES BEFORE, DURING AND AFTER OESTRUS AND ESTABLISHMENT OF PREGNANCY IN REPEAT BREEDER COWS

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ABSTRACT

An experiment was conducted to study the effect of progesterone before, during and after AI in repeat breeder crossbred cows. A total of 16 repeat breeder cows were artificially inseminated twice at 24 hours interval following sexual rest of one oestrous cycle. Blood samples were collected from all the cows on day 10 of oestrous cycle preceding AI, at the time of first AI (oestrus) and at second, fourth and 6th day following first AI for progesterone assay. The first service conception rate observed was 18.75 per cent. The mean serum progesterone levels on corresponding days of blood collection in cows which became pregnant was 7.19±0.46, 0.36±0.08, 1.05±0.20, 1.70±0.22 and 3.37±0.77 ng/ml, respectively and the values in cows which did not conceive were 5.24±0.43, 0.51±0.09, 0.57±0.15, 0.99±0.27 and 1.62±0.26 ng/ml.

KEY WORDS: Progesterone, Oestrus, AI, Pregnancy, Repeat breeder cows.

INTRODUCTION

Inadequate endocrine support to the uterus might be a cause for early embryonic death due to inadequacy of the suitable uterine environment leading to repeat breeder problems in cows. Monitoring of hormone levels before, during and after oestrus might be helpful in establishing the cause for female infertility (Gupta et al., 1998). Progesterone is essential to establish pregnancy in mammals (Oyedipe et al., 1986). Since plasma or serum progesterone concentration directly reflect the function of corpus luteum, it was considered as an indicator of ovarian function and hence, could be used as a marker to predict the fertility in cows (Bulman and Lamming, 1978). This experiment was designed in repeat breeder crossbred cows to study the effect of serum progesterone profiles before, during and after oestrus (AI) on pregnancy establishment in repeat breeder cows.

MATERIALS AND METHODS

Sixteen healthy, parous crossbred cows which failed to conceive after three or more AIs at the Gynaecology unit were selected for the study. Rectal examination revealed no gross palpable abnormalities and obvious infections of the genital tract. They exhibited the oestrus at 18-24 days interval with clear genital mucus discharge. Sexual rest was given during one oestrus and artificial insemination (AI) was done twice during the subsequent oestrus at 24 hours interval. Blood samples were collected in all the animals on day 10 after oestrus of the previous oestrous cycle following sexual rest. Again blood samples were collected during first AI (oestrus) and at day 2nd, 4th and 6th day following first AI. Serum was separated by centrifuging the clotted blood at 3000 rpm for 10 minutes. The sera samples were stored at - 80^0C until progesterone assay, which was carried out using progesterone RIA kit (PROG- CTK - 4; DiaSorin, S.R.L. Saluggia (vc), Italy) employing solid phase Radioimmunoassay technique. The radio activity was measured in I^{125} gamma counter. Pregnancy diagnosis was done at 60 days post AI in all the animals and the first service conception rate was correlated with the serum progesterone profiles at different stages of oestrous cycle of the selected cows.

RESULTS AND DISCUSSION

The first service conception rate obtained in this study was 18.75 (3/16) per cent. The mean serum progesterone levels on day 10th of the previous oestrous cycle, at the time of oestrus (First AI) and at second, fourth and sixth day following first AI in cows which became pregnant (n=3) was 7.19±0.46, 0.36±0.08, 1.05±0.20, 1.70±0.22 and 3.37±0.77 ng/ml, respectively and the corresponding values in cows which did not conceive (n=13) were 5.24±0.43, 0.51±0.09, 0.57±0.15, 0.99±0.27 and 1.62±0.26 ng/ml. The

significantly (P<0.01) higher concentration of serum progesterone observed on day 10 of the previous cycle in pregnant cows (7.19±0.46) compared to non-pregnant cows (5.24±0.43 ng/ml) was in accordance with the finding of Breuel et al. (1989). Folman et al. (1973) reported that the progesterone level during the oestrous cycle preceding insemination was closely related to the occurrence of conception.

In the present study, progesterone profile during oestrus in pregnant cows showed marginally lower concentration when compared to non-pregnant cows. This is in agreement with the finding of Gustafsson et al.(1986). Higher progesterone level at the time of oestrus might affect sperm and ovum transport as well as the fertilization process and subsequent embryo passage to the uterus (De Silva et al., 1981). Anderson and Day (1994) opined that increased progesterone level blocked the LH release and affected oocyte maturation and ovulation. Further, Duchens et al. (1995) stated that suprabasal progesterone level delayed the ovulation and led to retention of graafian follicle for an extended period and damage of the oocyte to such an extent that even inseminating close to the time of ovulation did not ensure conception. Thus, the marginally higher concentration of progesterone at oestrus recorded in non-pregnant cows might have been one of the contributing factors for the failure of conception in this study.

In the present investigation, from day 2 to 6 post AI, the concentration of progesterone was higher in pregnant cows than in non-pregnant cows. Further, the difference was statistically significant (P<0.01) on day 6 after AI. This was in agreement with the finding of earlier study on repeat breeder cows (Bugalia and Sharma, 1990). Many investigators studied the progesterone concentrations in pregnant and non-pregnant cows to determine whether these affected the fertility. It was reported that the progesterone levels were higher in pregnant cows than in non-pregnant cows starting from day 9 (Henricks et al., 1971), 10 (Peters, 1996), 14 (Pursley et al., 1995) and 16 (Sreenan and Diskin, 1983) after mating. Others reported no difference until day 18 after insemination (Bulman and Lamming, 1978). Peters (1996) suggested that progesterone secretion could be a limiting factor to embryonic development during the first few days of pregnancy in bovines. The more rapid increase in progesterone level from day 2 to 6 post insemination in pregnant cows compared to non-pregnant cows in this study indicated a higher level of luteal activity which might have resulted in conception. Hence it is concluded that higher concentration of progesterone during the oestrous cycle preceding the insemination, lower concentration of progesterone during breeding and increasing level of progesterone during early luteal phase are the determining factors of pregnancy establishment in repeat breeder cows.

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